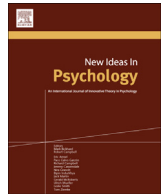




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Aesthetic interaction as fit between interaction attributes and experiential qualities

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ABSTRACT

Designing an aesthetic interaction is an important issue for Interaction Design (ID) and Human-Computer Interaction (HCI). While a number of frameworks exist, the experimental study of potential underlying principles remains rare. In this paper, we suggest that particular interaction attributes (e.g., “fast”) are systematically related to particular experiential qualities (e.g., “feeling competent”) and that interaction “feels better” if interaction matches the intended experience. A laboratory study ($N = 32$) explores this notion by testing two different ways of interacting within the same activity (opening a wine bottle) in two different experiential scenarios (focusing on relatedness, focusing on competence). Two corkscrews with different interaction profiles were used: one assumed to support a feeling of competence and the other to support relatedness. As expected, we found systematic shifts in preferences for specific corkscrews, differences in affective experience and in the relationships between interaction attributes and experiential qualities depending on the fit of interaction to the experience.

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1. Introduction

In Human-Computer Interaction (HCI) and academic Interaction Design (ID), aesthetics became a research topic only in the late nineties of the last century, when Noam Tractinsky (1997) replicated a study of Kurosu and Kashimura (1995) about the relationship between “objective” usability and subjective judgments of usability and beauty (for an overview see Tractinsky, 2013). He argued that perceptions of usability (an attribute of interaction) and beauty (an attribute of graphical user interfaces) were related. This spawned a respectable thread of research, which explored how the visual beauty of an interface may affect the perception of and ultimately interaction with the product (see Hassenzahl, 2008, for an overview). While this research introduced “beauty” into HCI, it remained adamant in understanding aesthetics as an attribute of the interface (the “looks”) and usability as an attribute of the interaction (the “feel”).

From the perspective of ID, this duality appears impoverished and early on, Djajadiningrat and colleagues (Djajadiningrat, Overbeeke, & Wensveen, 2000, p. 132) challenged it. They urged

the field to shift emphasis “from a beautiful appearance to beautiful interaction, of which beautiful appearance is a part.” This “aesthetic of use” should seek developing a “more nuanced cooperation with the object – a cooperation which, it is hoped, might enhance social contact and everyday experience” (Djajadiningrat et al., 2000, p. 132). To them – and to us as well – usability, which is predominantly emphasizing efficiency, was a concept too narrow. Nowadays, initiating a phone call can be done by pressing buttons, by touch gestures or even speech input. While different ways of interacting with objects may differ in usability, they also differ with respect to many other aspects. Whether a “swipe gesture” is appropriate or even “feels good”, is not a sole matter of, for example, efficiency. In fact, many new interaction techniques may even be less efficient. Touch lacks precision, but still provides a “feeling” (i.e., experience) that is considered “good” and desirable. State-of-the-art “conversational interfaces” (McTear, Callejas, & Griol, 2016) may in fact be slow due to their linear nature, but still provide the particular experience of an intelligent counterpart through the specific interaction. As Djajadiningrat et al. (2000, p. 132) argued: “A user may choose to work with a product despite it being difficult to use, because it is challenging, seductive, playful, surprising, memorable or rewarding, resulting in enjoyment of the experience. There is more to interaction than efficiency and ease” (see also Hassenzahl, 2010, for an extended discussion).

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All this calls for developing a better understanding of an *aesthetic of interaction* in Interaction Design (ID). To us, the term “aesthetics” has several connotations in the present context: First, it is a guiding system helping (interaction) designers to make design choices. In this sense, beauty as a quality is meant as “verdictive” (Zangwill, 2003), i.e., concerned with distinguishing the “good” from the “bad”. Since most interaction designers traditionally care about the experiences emerging for people through interaction, the quality of peoples’ experiences becomes the major yardstick to distinguish the good from the bad. Second, we need to better understand the “substance” (Zangwill, 2003) of an aesthetic interaction to be able to design it. This requires models and frameworks. However, since aesthetic interaction should result in positive experience there is a need to explore whether key assumptions of models are psychologically sound and empirically justifiable. Third, arguably usability can be thought of as a particular aesthetic of interaction. It is verdictive since it aims at improving people’s experience of use. Its substance is ease, speed and efficiency. However, in line with a substantial empirical body of research in HCI and ID (see Diefenbach, Kolb, & Hassenzahl, 2014 for an overview), which eventually led to the notion of user experience as complementing usability, usability is considered too narrow. Thus, aesthetics of interaction as a term also implies a broader view on what constitutes interaction: from simply easy to beautiful.

In the present paper, we start from a review of available approaches to the aesthetic of interaction (Lenz, Diefenbach, & Hassenzahl, 2014) and other research to provide an overview of current theorizing in ID. Based on this, we develop a hypothesis of beautiful interaction which argues for a necessary fit between designed interaction (characterized by spatio-temporal attributes) and emerging experiences (characterized by psychological needs) and test it empirically.

2. Background and research questions

So far, no comprehensive, widely accepted model of an aesthetic interaction exist. Recently, Lenz et al. (2014) reviewed and synthesized 19 independent models associating themselves with the notion of an aesthetics of interaction (see Table 1 for an overview).

In sum, those models suggested 151 “dimensions”, “qualities”, “attributes” or “parameters” of an aesthetic interaction with substantial overlap. Broadly, these attributes fell into two groups: One dealt with spatio-temporal attributes on a senso-motoric level describing physical aspects of interaction (e.g., speed, duration, pressure, orientation). The other consisted of attributes describing feelings and meaning emerging through interaction (e.g., surprise, thrill, challenge, trust). The majority of the proposed models either focused on the physical aspects or the experiential aspects. Although quite a difference, both types of models claimed to be models of aesthetic interaction. Surprisingly, only two of the 19 reviewed models discussed explicit links between concrete “forms of interaction” and the emerging “experiences” (Landin, 2009; Lim, Stolterman, Jung, & Donaldson, 2007). Lim and colleagues for example introduce the concept of *interaction gestalt* and *interaction gestalt attributes* and state: “In any interaction, the interaction gestalt is experienced by a user and evokes the user’s subjective experience of the quality of the interaction [...] However, only thinking about the user experience cannot fully guide designers to explore a design space of possible aesthetic interactions in a concrete way. This means that designers should have knowledge of how to shape aesthetic interactions in a more visible, explicit, and designery way. This is a kind of knowledge we are currently missing in HCI” (p. 240). They search for a way “to create a language that helps a designer understand, which attributes are to be considered in order to create a certain gestalt that in turn will result

in desired user experiences” (p. 240). However, they neither propose concrete links between *interaction gestalt* and *interaction gestalt attributes* nor test their hypothesis empirically.

Based on self-regulation/action theory (e.g., Carver & Scheier, 1998), Hassenzahl (2010) suggested to explicitly distinguish different levels when addressing user experience and interaction: Whereas the motor-level (the How) addresses the physical interaction itself, i.e., the concrete sequence of operations necessary to achieve a goal (e.g., selecting your best friend’s number from your contacts and pressing the dialing button to start a phone call), the be-level (the Why) addresses emerging thoughts, feelings and meaning (e.g., feeling more comfortable and safe in a dark street since you’re “not alone” anymore [security] or being stimulated during a long wait [stimulation]). Key concern on the experiential level is the emergence of positive experiences mediated through technologies. Positive experience is further conceptualized as positive affectivity, which emerges from the fulfillment of psychological needs (e.g., Hassenzahl, Diefenbach, & Göritz, 2010; Sheldon, Elliot, Kim, & Kasser, 2001).

Both assumed levels correspond to the two distinct conceptualization of an aesthetic of interaction found in the literature (Lenz et al., 2014). Importantly, Hassenzahl further assumes a link between both levels, with interaction being the designer’s primary means to shape an experience. Consequently, emerging positive experience with technology should be traceable to properties of the interaction.

A qualitative study (Lenz, Diefenbach, & Hassenzahl, 2013) provided a step into exploring this assumption by using interviews to link particular interaction attributes to particular experiential qualities. Participants were asked to provide descriptions of interactions they liked (found positive), for example “making a coffee with my Bialetti espresso machine” and were prompted to explicate related positive experiences. A number of links emerged. For example, a “slow” interaction implied appreciation of the moment and the interaction itself, while a “fast” interaction was related to being stimulated, efficiency and the outcome of the interaction.

While Lenz and colleagues’ study started from the interaction and its basic attributes to further reflect on related experiences, we carried out an unpublished study, which used the opposite strategy. We set a particular psychological need as a starting point (e.g., the experience of autonomy, security, stimulation, competence, popularity, relatedness, or meaning, see Hassenzahl et al., 2010; Sheldon et al., 2001) and then asked for typical ways to experience these needs in everyday live. This first step (N = 214) revealed a surprisingly high overlap among participants, resulting in a set of “top” activities for each need, such as “opening a bottle with a lighter” as a particular example of a competence experience. These activities served as a basis for a further study (N = 181). Participants described their latest experience of one of those activities (e.g., opening a bottle with a lighter) in terms of attributes of the interaction and the experience (i.e., need fulfillment, overall positive experience). Perception of the interaction was assessed with the *Interaction Vocabulary* (Diefenbach, Lenz, & Hassenzahl, 2013). It consists of eleven descriptive, non-judgmental, non-technology bound attributes in contrastive pairs, such as *slow-fast* or *stepwise-fluent*. Need fulfillment was measured with a questionnaire adapted from Sheldon et al. (2001; see Hassenzahl et al., 2010) featuring items such as “During the experience, I felt that I was taking on and mastering hard challenges” (competence). Ratings on need fulfillment largely confirmed the assumed relation between needs and activities. More importantly, further correlational analyses showed that particular interaction attributes were important for explaining variations of how positive the different activities were experienced by the participants. Competence-related activities, for example, were experienced as more positive, the more

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